IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

PERSONALIZED MEDIA COMMUNICATIONS, LLC,	)	
Plaintiff	)	
v.	)	**Case No. 2:15-cv-01366-JRG-RSP**
APPLE, INC.,	)	
Defendant	)	

DECLARATION OF ALFRED C. WEAVER, PH.D., IN SUPPORT OF PMC'S OPPOSITION TO APPLE'S MOTION TO DISMISS

I, Alfred C. Weaver, Ph.D., declare as follows:

1. I have been retained by counsel for Personalized Media Communications, LLC ("PMC") as an expert witness to document the state of the art of data communication networks, data encryption/decryption and streaming media in the 1980s, and, in particular, 1981 and 1987. I have also been asked to consider whether the inventions claimed in the asserted claims of the Patents-In-Suit are directed to abstract ideas or whether they amount to significantly more than the purported abstract ideas posited by Defendant in its pending Motion to Dismiss. Additionally, I have been asked to analyze whether, assuming the claims to be directed to some abstract idea, they nevertheless include inventive concepts beyond what was conventional at the relevant times.

2. I am being compensated for my review of materials in this case and the preparation of this declaration at the rate of $400 per hour (plus expenses). My compensation is not determined by, contingent on or otherwise affected by the outcome of this case.

I. QUALIFICATIONS

3. My qualifications for forming the opinions set forth in this declaration are summarized here and further detailed in my *curriculum vitae*, which is attached hereto as Exhibit 1. Also included in Exhibit 1 is a list of my publications.

4. I earned a Bachelor of Science in Engineering Science in 1971 from the University of Tennessee. I also earned a Master of Science in Computer Science from the University of Illinois at Urbana-Champaign in 1973. Thereafter, I earned a Ph.D. in Computer Science at the University of Illinois at Urbana-Champaign in 1976.

5. I am currently a Professor of Computer Science and the Associate Chair of the Department of Computer Science at the University of Virginia ("UVa"). I have been employed at UVa continuously since 1977. Over the period of my employment at UVa, I have taught 28 different courses, including electronic commerce, operating systems, computer networks, and various programming courses. Moreover, I have been the graduate advisor for 69 Ph.D. and master's students, all in Computer Science.

6. In addition to my teaching duties, I am also the Founding Director of UVa's Applied Research Institute, a group of faculty engaged in research areas related to national security and funded by both government and industry. To date, I have published 16 books and book chapters, 30 refereed journal articles, 139 refereed conference publications, and 80 technical reports. I currently serve on the Advisory Council of the Editorial Board of IEEE *Computer* magazine.

7. As a researcher, I have served as Principal Investigator or co-Principal Investigator of 130+ research projects funded by the federal government and private industry. Recent research projects include 3D printing, automated analysis of published scientific literature, secure mobile computing, crowdsourcing, data integrity, and trustworthy computing.

8. I have founded five companies. One of these, Network Xpress, Inc., was a spin-off from research work in computer networks funded by the U. S. Navy at UVa. At its peak, another company, Reliacast, Inc., employed 90 people and developed software for secure streaming of multimedia. Reliacast was ultimately sold to Comcast.

9. I have served as an expert witness in 20+ patent infringement cases since 1988. Six of those cases have gone to trial. In the past four years I have testified in court in two cases:

- *VS Technologies v. Twitter, Inc.*, No. 2:11-cv-00043-HCM-TEM in the United States District Court for the Eastern District of Virginia (Norfolk). In that case, I testified on behalf of Twitter.
- *ePlus, Inc. v. Lawson Software, Inc.*, No. 3:09-cv-00620-REP in the United States District Court for the Eastern District of Virginia (Richmond). In that case, I testified on behalf of ePlus.

A complete list of cases in which I have testified at deposition, hearing or trial in the past 4 years is attached hereto as Exhibit 2.

II. MATERIALS REVIEWED AND RELIED UPON

10. In preparing my opinions detailed in this declaration, I have reviewed and considered the claims and specification of U.S. Patent Nos. 8,191,091 (the "'091 Patent"); 8,559,635 (the "'635 Patent"); 7,752,649 (the "'649 Patent") and 8,752,088 (the "'088 Patent") that PMC has asserted in this litigation (collectively, the "Asserted Patents"). I have also reviewed Apple's Motion to Dismiss and the exhibits thereto.

11. I have also relied on my personal experience. I was born in 1949 and grew up in an era when radio, television, and telephones were already deployed and in widespread commercial use. The ARPAnet, the precursor to today's Internet, was developed in 1969 when I was an undergraduate at the University of Tennessee. While cryptography is an ancient topic,

commercial-grade computer-based encryption *(e.g.*, the Data Encryption Standard) was first certified by the National Bureau of Standards in 1975 while I was a Ph.D. student at the University of Illinois.

12. I have also relied on years of education, teaching, and research experience concerning software, programming, encryption, streaming media, circuit design, computer architecture, digital logic design, embedded systems, distributed computing, consumer electronics and networks as a basis for forming my opinions. Of particular relevance is my teaching experience. I taught the first microcomputer course at UVa when I joined the Department of Computer Science as an Assistant Professor in 1977. In my microcomputer lab, I employed self-developed telephone transmission networks as well as the Ethernet local area network. Additionally, I taught UVa's first computer networks course in 1980.

III. LEGAL STANDARDS

13. I am informed and understand that under the Patent Act an inventor may patent any new and useful process, machine, manufacture, or composition of matter.

14. I am further informed and understand that there are certain exclusions from patentable subject matter for laws of nature, natural phenomena and abstract ideas.

15. I am informed and understand, however, that an invention is not rendered ineligible for a patent simply because it involves an abstract concept. That is because, at some level, all inventions embody, use, reflect, rest upon, or apply laws of nature, natural phenomena or abstract ideas. Therefore, I am informed and understand that for abstractness to invalidate a patent claim it must exhibit itself so manifestly as to override the broad statutory categories of eligible subject matter. I am informed and understand that the rationale is one of preemption, namely, a concern that patent law not inhibit further discovery by tying up the future use of the building blocks of human ingenuity.

16. I am informed and understand that the U.S. Supreme Court has set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible ***applications*** of those concepts. Thus, I am informed and understand that the ***application*** of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection. Therefore, I am informed and understand that in a first step in the patent eligibility analysis, one must determine whether the claim is directed to one of those patent-ineligible concepts. If not, the claim is patent-eligible.

17. I am informed and understand that even if a patent claim is directed to one of the patent-ineligible concepts, then, in a second step, one must consider the elements of the claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible one. This step of the inquiry asks whether the elements of the claim add an "inventive concept" that is sufficient to ensure that the claim in practice amounts to significantly more than a patent upon the ineligible concept itself. This inquiry includes evaluating the other claim limitations to determine whether they are merely conventional or routine in the relevant field at the time of the invention. If not conventional and routine, the other limitations ensure that the claim is something more than an attempt to patent the abstract idea itself. My understanding is that we do not employ hindsight from today in evaluating whether claim limitations are routine or conventional; rather, we conduct that inquiry as of the priority date of the claimed inventions, which in this case is 1981 or 1987.

18. I am further informed and understand that technological solutions to problems arising out of new technologies can be patent-eligible. By contrast, some business practice known from the pre-Internet world does not become patentable with the routine instruction to "perform it on the Internet" or implement it on a generic computer.

19. However, I am informed and understand that an invention is patent-eligible where the claimed solution is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks.

IV. PERSON OF ORDINARY SKILL IN THE ART

20. I am informed and understand that the claims of the patent are judged from the perspective of a hypothetical construct involving a "person of ordinary skill in the art." The "art" is the field of technology to which the patent is related. I understand that the purpose of using the viewpoint of a person of ordinary skill in the art is for objectivity and to avoid hindsight bias.

21. In my opinion the asserted claims of the Patents-In-Suit are directed to a person with at least a bachelor's degree (or equivalent) in digital electronics, electrical engineering or computer engineering having two to five years of post-degree experience in system implementation.

22. I am qualified as a person of at least ordinary skill in the art and my qualifications enable me to provide opinions regarding the claims of the Patents-In-Suit from the perspective of the person of ordinary skill in the art.

V. DATA COMMUNICATIONS IN THE 1980'S

A. Electronic Transmission of Information

23. The electronic transmission of information can be accomplished in multiple ways depending upon the type of information (analog or digital) and the type of transmission technology (analog or digital).

24. An analog signal is any continuous signal for which the time varying feature (variable) of the signal is a representation of some other time varying quantity, *i.e.,* analogous to another time varying signal. Three examples of analog (continuous-value) data are: a) the

changing rotational speed of a motor, b) the varying current output by a microphone circuit in a telephone handset, and c) the variable brightness of the horizontal scan line of a cathode ray television tube. Analog transmission media are exemplified by radio and television distribution over (i) wired (*e.g.*, coax cable television) and (ii) wireless (*e.g.*, broadcast) networks.

25. On the other hand, a digital signal is not continuous and is instead restricted to some number of discrete values. Three examples of digital (discrete-value) data are: a) the *seconds* field of a digital clock that can display the 60 integers from 0 to 59 (and no others), b) a value indicating whether a two-position switch is open (0) or closed (1), and c) a computer transmission of a single printable character using an n-bit code in which any single combination of the n bits represents exactly one of the 2^n possible printable characters. Digital transmission media are exemplified by (i) an electrical circuit in which, at any point in time, a voltage level is high (a logic 1) or low (a logic 0), or (ii) by a fiber optic cable in which, at any point in time, a signal level is high (logic 1) or low (logic 0).

26. The terminology surrounding information transmission can sometimes be confusing. *Analog and digital data* refer to the type of information being transmitted (continuous or discrete, respectively). *Analog and digital transmission* refer to the underlying electronics of the transmission network (*i.e.*, the way the electronics work). Analog data can be transmitted over an analog transmission channel directly (without conversion), or over a digital transmission channel by using an analog-to-digital converter. Digital data can be transmitted over a digital transmission channel directly (without conversion), or over an analog transmission channel by using a digital-to-analog converter. Analog and digital *media* refer to the way content is represented. As such, it may affect how the content is transmitted, but not always. A JPEG file on my computer is digital media, but it may not have been stored on my computer due

to a transmission. I could have inserted a USB memory stick containing the file into a disk drive, for example. Thus, *media* should not be confused with *transmission.*

B. Conventional Broadcast Systems to Distribute Programming

27. In the early 1980s, information from a transmitter to a receiver occurred in predominantly one of two ways: (i) one-to-many distribution (*e.g.*, radio and television), or (ii) one-to-one distribution (*e.g.*, telephones and local area networks). It should be noted that in special cases, radio and television could support one-to-one communication and telephones and local area networks could support one-to-many communications.

28. An example of one-to-many distribution in the 1980s was the popular television show "Magnum, P.I." For example, when the broadcast originator (in this case the Columbia Broadcasting System or CBS) started distributing the programming at 8:00 pm on Saturdays, all local CBS affiliate stations received the programming (via over-the-air broadcast, satellite, microwave, cable, or other means), and, in turn, transmitted the programming to their local audiences.

29. The local CBS affiliate television station would typically rebroadcast the show immediately on its local channel, with perhaps some editing such as the selection of local advertisements to insert at the commercial breaks. Radio distribution was handled similarly. While the comments which follow are written to describe television programming, they are equally applicable to radio.

30. The one-to-many nature of radio and TV meant that all viewers were watching and/or listening to essentially the same programming (with the exception of local ads). A viewer had no way of interacting with the broadcast television program in any way that would allow the viewer to customize or personalize what was being shown. In other words, the broadcasted programming content of any received channel was fixed and unalterable. Each channel's

transmission to a given locale was received identically by all receiver stations in that locale. Whatever was received by user X on channel Y was identical to the programming received by user Z on channel Y. Thus, radio and television programming were deemed to be mass-market experiences.

31. The fixed and unalterable nature of broadcast programming in the 1980s was due to several factors. On the transmitter side, conventional transmitters lacked the following capabilities:

- to know directly which receivers, if any, were actually receiving the transmitted program;
- to selectively send one program stream to one receiver and another programming stream to a different receiver on the same channel;
- to know which viewers were watching which programs or which channels (which spurred the growth of polling companies to provide that information which was critical to advertisers);
- to protect pay-per-view content using encryption at the transmitter and decryption at the receiver;
- to securely transmit decryption keys, or the location of keys, or a method of calculating a key, or a reference to a method of calculating a key, or other method of remotely controlling access to decryption keys; or
- to control any peripheral device at any receiver station (*e.g.*, videotape recorder/player, printer, HVAC controller), including the TV itself.

On the receiver side, conventional receivers lacked the following capabilities:

- to know whether its attached TV was turned on or off;

- to control automatically the channel to which a TV was tuned, or when to tune it to any particular channel based on received control signals;
- to alter the content of the received program to embellish it with local, user-specific information;
- to use its incoming programming to control an attached peripheral device;
- to receive executable computer programs to accomplish particular functions;
- to process information relevant to only this one receiver to enable the personalization of content;
- to make local decisions based upon a combination of incoming information (*e.g.*, closing stock prices) and local information (*e.g.*, my stock portfolio) to produce local, value-added information (*e.g.*, the value of my stock portfolio).
- to select and pay for any personally desired programming;
- to decrypt encrypted programming;
- to detect and decrypt encrypted decryption keys embedded within programming that are subsequently used to decrypt the programming itself or to otherwise locate secure decryption keys needed to decrypt the programming; or
- to track functions it carries out (such as decryption) and report those functions back to a remote source.

C. Conventional Methods of Conditional Access in 1981

32. In 1981, the ability to transmit digital television and other types of digital content had been demonstrated; however, the conventional practice was to transmit television and other types of programming (*e.g.*, radio) in its analog form (*e.g.*, in compliance with the NTSC standard for television). How television was transmitted to users in 1981 is illustrative for other

types of electronically transmitted programming. For example, television was transmitted via cable or over-the-air (*e.g.*, via satellite or from local transmission towers). A viewer could simply connect a compatible television receiver to the signal using a coax cable or an antenna, and the TV would then display the transmitted programming on its screen. Unrestricted access to television programming was problematic because many service providers were dependent on users paying for access to content. Hence, there was a need to restrict access to television programming to only authorized recipients. This access was termed "conditional access" in the industry.

33. The conventional practice in 1981 to restrict access to transmitted content was to scramble the analog television signal before it was broadcast and then to descramble the analog signal received in scrambled form at a receiver so that the original programming could be displayed to users. Scrambling is a process that manipulates an analog television signal in a predetermined fashion such as reordering the 525 horizontal lines in a standard TV frame or by moving the standard video synchronization signal to a non-standard frequency so that the resulting image is distorted. Descrambling an analog signal applies the same process in reverse to remove the intentionally introduced distortion so that the television programming can be displayed to users. Descrambling is an analog process that is applicable to analog signals but cannot meaningfully be applied to digital signals such as digital television transmissions.

34. In 1981, encryption and decryption algorithms that could be used to encrypt and decrypt digital data were also known (*e.g.*, the Data Encryption Standard (DES) certified by the National Bureau of Standards and published as a Federal Information Processing Standard in 1977). Encryption is a process that renders the encrypted data unintelligible unless it is first decrypted and returned to its original form. Encryption and decryption are only applicable to

digital information – not analog signals. Two common types of encryption algorithms that were known in 1981 include symmetric key and public key encryption algorithms. Symmetric key encryption algorithms use the same key to encrypt and decrypt data. Public key encryption algorithms use two related keys – a public key and a private key – to encrypt and decrypt data. For example, data encrypted with a public key may be decrypted using the related private key. Employing encryption to protect data from unauthorized access depends upon preventing unauthorized access to the encryption key (same value as decryption key) for symmetric encryption algorithms or to the private key for public key encryption algorithms. This presents a challenge when the transmitter that encrypts data and the receiver that decrypts that data are located at different physical locations: how could the key be moved safely from the encryptor (transmitter) to the decryptor (receiver)? If the decryption key were to become known to others rather than the intended recipient, anyone who could intercept the encrypted programming could use the no-longer-secret key to decrypt it and therefore avoid paying for it. While algorithms such as DES provided methods of encryption, they did not solve the problem of secure key distribution in networked systems.

35. Even though both encryption and digital transmission of programming (*e.g.*, television) were known in 1981, it was certainly not routine or conventional to encrypt digital television or other digital programming before it was transmitted to restrict access only to authorized users.

D. Conventional Systems of Distributing Programming Were Not Interactive in 1981

36. In the early 1980's, conventional content distribution systems to distribute electronic programming (*e.g.,* radio, television) generally broadcast content (for example, different television or radio programs) on different channels or frequencies. User interactivity

was limited to switching between channels that broadcast different programming at a television or radio receiver. These systems simply broadcast programming and users could simply choose to watch it or not without any interaction with components that broadcast the programming.

37. Pay-per-view systems were also known in the early 1980s, where a user could pay for access to a particular program transmitted on a particular channel at a particular time. The conventional practice for ordering pay-per-view events (*e.g.*, a boxing match) required viewers who desired to watch the content to telephone the cable provider in advance and request access to the program by providing their account details and method of payment.

E. Packet Switched Networks Like the Internet Were Known in 1981

38. In 1981, radio and TV distribution were examples of one-to-many programming distribution. In the conventional operation of these types of networks in 1981, the same content was received by all or multiple users. There was no ability to personalize content for individual users. This content could be received at the same time by all users or recorded and then broadcast from an intermediate location in the distribution network to selected groups of users at a later time. One-to-one communication networks were also in common use in 1981. For example, a regular telephone call placed between users over the Public Switched Telephone Network (PSTN) establishes a one-to-one connection. Telephone networks generally used persistent connections to transfer data between locations with all data between the source and destination travelling over the same path.

39. Packet switched networks (*e.g.*, the Internet) also existed in 1981. Packet switched networks use digital control signaling and operate differently from connection-oriented networks, such as television broadcast and the PSTN. Packet switched networks segment the transmission of data into pieces termed "packets" and transmit each packet separately. These packets are then reassembled in order at the destination to reconstruct the information that was

transmitted. Packet switched networks do not use persistent connections to transmit data but instead each individual packet may be routed from its source to its destination over any number of different paths. For example, a first data packet could be routed between New York and San Francisco via Denver and a second packet of the same transmission stream could be routed via Kansas City.

40. In 1969, an early packet switched network commissioned by the U.S. Department of Defense, called the ARPAnet because it was a network funded by the U.S. Government's Advanced Research Projects Agency, was demonstrated. The design of this system has matured over time to become today's Internet. Indeed, early versions of protocols that remain the workhorses of the modern Internet, such as the Internet Protocol (IP), Transmission Control Protocol (TCP), and User Datagram Protocol (UDP) were published before 1981. *See, for example*, RFC 760 (attached hereto as Exhibit 3).

F. Streaming Media Was Not Conventional in 1987

41. Streaming media is digital media content that is continuously received by and presented to an end-user while being continuously delivered by a provider over a computer network. Streaming media is an alternative to downloading a particular media file.

42. From the late 1980s through the 1990s, consumer-grade personal computers became powerful enough to play various media. However, there were several technical issues related to streaming that prevented adoption of streaming. For example, computers required sufficient CPU power and bus bandwidth to support the required data rates and, additionally, low-latency interrupt paths were needed in the operating system to prevent buffer overrun. Thus, during the late 1980s and early 1990s, media were typically delivered to end users over non-streaming channels, such as by downloading a digital file from a remote server and then saving it

to a local drive on the end user's computer, or storing it as a digital file on a CD-ROM and playing it back at a later time.

43. Early streaming media was based on a variety of proprietary protocols with limited adoption.

44. The Moving Picture Experts Group (MPEG) working group was established in January 1988. Development of the MPEG-1 standard for compression of digital video and audio began in May 1988. After many meetings, and four-and-a-half years of development and testing, the final standard (for parts 1-3) was approved in November 1992 and published a few years later. In July 1990, before the first draft of the MPEG-1 standard had been written, work began on a second standard, MPEG-2, intended to extend MPEG-1 technology to provide full broadcast-quality digital video.

45. During the late 1990s and early 2000s, Internet users saw greater network bandwidth, the use of standard protocols and formats for the delivery of digital multimedia and the commercialization of the Internet, which was opened to commercial traffic in 1995. These developments facilitated the adoption of streaming media.

46. On June 24, 1993, the band "Severe Tire Damage" was playing at Xerox PARC. Scientists at Xerox PARC were working on technology for broadcasting on the Internet using multicasting. As proof of their technology, the band's performance was broadcast and could be seen live in Australia, for example. This event is believed to be the first demonstration of live streaming of multimedia.

47. On September 5, 1995, ESPN SportsZone streamed a live radio broadcast of a baseball game between the Seattle Mariners and the New York Yankees to thousands of its subscribers worldwide using technology developed by a Seattle-based startup company named

Progressive Networks (later known as RealNetworks).

48. In 2007, a company named Move Networks introduced HTTP-based adaptive streaming that uses the dominant HyperText Transport Protocol (HTTP) to deliver media in small file chunks while using a player application on a user's device to monitor download speeds and/or fullness of the buffer and request chunks of varying size in response to changing network conditions. The technology allowed widespread use of streaming media, while at the same time eliminating annoying buffering and connectivity issues for users. Standardization work for this technology began in 2009 with the 3GPP (Third Generation Partnership Project) and shifted to the MPEG working groups in 2010. In April, 2012, a new standard was released known as Dynamic Adaptive Streaming over HTTP, or MPEG-DASH.

49. The above history of streaming digital media illustrates that streaming digital media was not conventional practice in 1987. Indeed, there were various technological hurdles to overcome at that time, and it would be several years after 1987 before streaming digital media would come into widespread use. Moreover, network communications to control how to receive and process media received in messages were also not conventional in 1987. Nor could conventional receivers in 1987 externally communicate information relating to the usage of identified inputted multimedia signals, such as by, for example, recording how or where signals were passed during the consumption of multimedia content.

VI. THE ASSERTED PATENTS

50. The Asserted Patents stood apart from prior art systems in that they disclosed inventions recognizing that broadcast programming could be personalized down to the level of any one receiver, or any group of receivers. The unique feature and improvement of each invention was based on an embedding of digital information (commands and data) into the flow of the programming content already being transmitted. Each of the asserted claims of the

Patents-In-Suit described below comprises a technological advance over the conventional technologies that I have described in the preceding paragraphs.

51. The Asserted Patents utilize a combination of analog and digital *information*. Analog *media* includes over-the-air broadcast or cable-distributed radio and TV, which may use microwave, satellite transmission. Digital *media* includes recipes, stock information, commands and computer instructions, for example. *Programming* is the term in the patents, and the patents explain that "The term 'programming' refers to everything that is transmitted electronically to entertain, instruct, or inform, including television, radio, broadcast print, and computer programming as well as combined medium programming." *See* '091 Patent, 148:13-20. The Asserted Patents describe examples where an analog transmission can convey both analog and digital information from an originator (transmitting station) to a destination (ultimate receiver station or URS), possibly passing through an intermediate station.

52. The Asserted Patents comprise the vision of an end-to-end system that can distribute digital information over an analog or digital transmission system from a transmitter station to a receiver station, optionally passing through an intermediate station, including the methods for accomplishing that distribution. The transmitted digital information can be addressed to one or more receiver stations and can include commands, instructions, data, signals, computer programs, and/or other programming in either encrypted or non-encrypted form.

53. The digital information so transmitted can be encrypted by its originator, in whole or in part, and decrypted by its receiver using decryption key information (*e.g.*, the decryption key(s), or the location of the key(s), or a method of calculating a key) sent from the transmitter to the receiver. The decryption key information can itself be encrypted and it too can be decrypted by the receiver using information provided by the transmitter or stored at the receiver.

54. The Patents-In-Suit responded to the new possibilities opened up as transmission of digital content, instead of analog content, became more technologically feasible. The Patents-In-Suit describe an entirely new signal-processing system having multiple layers of transmitter station devices that are able to control addressable receiver devices in large networks.

55. The patented inventions addressed problems in the prior art by recognizing the significant improvements that could be accomplished if receivers could communicate with other devices in a network; if transmitters could control receivers such as, for example, by sending control instructions in the same information stream as programming content; and if receivers could use those control instructions to identify content addressed to individual users and to carry out controlled operations specific to a receiver device. Such a network, employing distributed computing and control, is able to provide customized user content, other new and useful types of content, and new modes of delivering that content. But such a system is enormously more complex than the one-to-many distribution structures in the prior art. Each of the four Patents-In-Suit discloses methods and apparatuses for addressing specific technical issues that arose for the first time in the context of the inventors' systems and methods for distributing personalized media content in a networked environment.

56. The conditional access technology claimed in the '091 and '635 Patents – which allows encrypted content to be transmitted along with encrypted digital control signals and requires decryption of the digital control signals first in order to unlock the encrypted content – inhibits piracy of TV content delivered in a cable, satellite or other networked system and unlocks encrypted content and services.

57. Similarly, the specific control signal processing methods and apparatuses claimed in the '649 and '088 Patents were developed specifically to take advantage of the networking and

data processing capabilities of the computer-implemented receiver station disclosed in the specification and to solve problems arising from networked systems.

58. At the time of the inventions of the Patents-In-Suit, the secure delivery of programming content along with related control signals to control or enable specific signal processing operations at remote receiver stations was a technical challenge particular to a distributed computing environment. The technical solutions the inventors conceived, developed and patented were novel and unconventional at the time. The patented inventions require specially-programmed equipment to implement various specific applications and functions, such as receiving incoming digital information transmissions, filtering or selecting control signals or other signals or specific content from the incoming information transmissions, decrypting the incoming information transmissions and/or causing pre-programmed instructions to execute upon receipt of instruct signals. None of these functions are mere algorithms or mental steps as they all rely upon specific hardware implementations at the least.

59. The specification of the Patents-In-Suit discloses methods and modes of communication of content that were unconventional at the time. For example, the specification discloses technology for "personalized television" where millions of viewers can watch content such as the "Wall Street Week" television show, but where the presentation for each individual viewer has been personalized through the delivery of supplemental content such as graphical overlays of the performance of the viewer's own stock portfolio for the week. '635 Patent, 10:40-15:12; FIGS. 1A-1C.

A. The '091 Patent Is Not Directed To An Abstract Idea

60. I am informed and understand that PMC contends that various Apple software applications and products which are compatible with Apple's FairPlay Digital Rights Management (DRM) scheme and computer servers which implement the FairPlay DRM scheme

infringe claims 13-16, 18, 20-21, 23-24, 26-27 and 30 of PMC's '091 Patent.

61. In its Motion to Dismiss, Apple asserts that the '091 Patent "fail[s] to claim anything other than an abstract idea of converting information from one format to another, *i.e.*, decrypting information, along with generic computer components and conventional functions that individually and collectively fall far short of claiming patent-eligible subject matter." Apple's Motion at 1. *See also* Motion at 16-17. I totally disagree. The claims are ***not*** directed only to decryption, nor are the claims simply converting data from one format to another. Apple has missed the crux of the claims.

62. In fact, the asserted claims of the '091 Patent (construed as PMC urges) are directed to solving a problem specific to the digital age: securely distributing and locating decryption keys over a network so that only authorized subscribers can access the key and decrypt the encrypted content. The claim language itself and the specification demonstrate this to be the case.

63. For example, claim 13 of the '091 Patent is directed to a method of decrypting programming at a receiver station. The method requires a step of receiving an encrypted digital information transmission including encrypted information. In this context, a person of ordinary skill in the art ("POSITA") would understand the claim term "encrypted digital information transmission" to refer to signals sent or passed from one location to another location to convey digital information which is in encrypted form. A POSITA would also understand "encrypted" or "encryption" to refer to an operation performed on digital data in conjunction with an associated algorithm and digital key to render the digital data unintelligible or unusable. Additionally, a POSITA would understand that "digital information," as used in the '091 Patent specification, refers to instructions/commands and data. *See* '091 Patent, 148:13-20. Thus, we

understand that in the first step of claim 13 unintelligible/unusable digital instructions/commands and data have been received.

64. The second step of claim 13 requires detecting in the encrypted digital information transmission the presence of an instruct-to-enable signal. A POSITA would understand an "instruct-to-enable" signal, as used in the '091 Patent claims, to be a signal carrying information used by a receiver station to enable the implementation of the enumerated operation, here, decryption of encrypted digital information. As explained in the '091 Patent specification, this enabling information can be a decryption key, a reference to where to locate a decryption key, a function that generates a decryption key or a reference to where to locate a function that generates a decryption key. *See* '091 Patent, 22:66-24:16 (a reference to a particular pre-stored key); 156: 4-9 (instructions on how to recover the decryption key); 156:28-41 (instructions that enable controller to load and run instructions that affect decryption); 151:44-52 (a cipher key itself is transmitted along with encrypted digital information).

65. In the third step of claim 13, the instruct-to-enable signal is passed to a processor.

66. The fourth step of claim 13 recites a step of "determining a fashion in which said receiver station locates a first decryption key by processing said instruct-to-enable signal." In other words, as explained above, there are different ways for the receiver station to identify or determine which decryption key to use to decrypt the received encrypted digital information portion. This step of the claim identifies which decryption key to use and how to locate it and/or generate it. A POSITA would understand that a decryption key is located based on the process indicated by the instruct-to-enable signal and that the decryption key in this context is digital data used by a device or method in conjunction with an associated algorithm to decipher (render intelligible or usable) encrypted digital information. *See, e.g.*, '091 Patent, 5:28-48; 8:50-51;

16:40-45.

67. The next step of the method of claim 13 entails locating the first decryption key based on the method identified in the prior step. The sixth step recites decrypting the encrypted information using the first decryption key (in other words, in conjunction with an associated algorithm), where the located decryption key is then used to render intelligible or usable the received encrypted digital information.

68. The seventh and final step of claim 13 requires outputting the decrypted programming.

69. Thus, far from simply claiming a process of "converting information from one format to another," as Apple contends, claim 13 of the '091 Patent specifies how to locate a digital decryption key, to be used for decrypting encrypted programming, based on signals received in a transmission. Further, again contrary to Apple's contention, a POSITA, reviewing claim 13, would understand this claim to focus more on decryption key distribution and management rather than on any particular decryption algorithm or data conversion technique.

70. Claim 14 depends from claim 13 and includes all elements of claim 13 and adds the additional requirement that the step of decrypting in claim 13 comprises using first and second decryption keys. Thus, only methods which use two digital decryption keys would be covered under this claim, and other techniques for converting information from one format to another would be excluded.

71. Dependent claim 15 depends from claim 14 and adds further specificity by providing the additional requirement to the elements of claim 14 that the first and second decryption keys are used to decrypt a video portion of the programming.

72. Dependent claim 16 adds a further requirement to the elements of claim 13 for a step of storing information evidencing the step of decrypting.

73. Dependent claim 18 adds a further requirement to the elements of claim 13 wherein the received encrypted digital information transmission includes television programming, which of course requires the encrypted digital information to be digital including the television programming.

74. Claim 20 is another independent claim which differs from claim 13 in that there is a step of detecting the presence of a first instruct-to-enable signal in the received encrypted digital information transmission that includes first processor instructions. A POSITA would understand the term "processor instructions," as used in the '091 Patent claims, to be commands or program code that is executed by, or enabling information that instructs, a processor to perform operations. *See, e.g.*, '091 Patent, 23:66-24:12. Thereafter, there is a step of executing the first processor instructions to provide a first decryption key. Next, there is a step of detecting a second instruct-to-enable signal that includes second processor instructions in the received encrypted digital information transmission. The method further includes a step of executing the second processor instructions to provide a second decryption key. The step of decrypting the encrypted information uses both the first and second decryption keys. The last step of the method of claim 20 is to output the programming based on the step of decrypting.

75. Dependent claim 21 is similar to dependent claim 16 except it depends from independent claim 20 rather than independent claim 13. Thus, claim 21 includes all of the steps of claim 20 plus the additional step recited in claim 21 of storing information evidencing the step of decrypting.

76. Dependent claim 23 depends from claim 20 and includes all of the steps of claim 20 plus the additional step of using the first and second decryption keys to decrypt a video portion of the programming.

77. Dependent claim 24 depends from claim 20 and adds the requirement that the received encrypted information includes television programming.

78. Claim 26 is another independent claim that recites a different approach for delivering decryption key information to receivers in a network. It differs from independent claims 13 and 20 in that, after the steps of detecting the presence of an instruct-to-enable signal and passing the instruct-to-enable signal to a processor, there are two steps not included in either claim 13 or claim 20. The fourth step of claim 26 recites a step of "automatically tuning said receiver station to a channel designated by said instruct-to-enable signal." A POSITA would understand this claim element to mean that there is a step of automatically switching the input of the receiver station to a particular communications path as designated by the instruct-to-enable signal. *See, e.g.*, '091 Patent, 148:63-65; 149:10-39 (sending SPAM messages to cause the controller 20 to switch to a master control channel at an appropriate time). Thereafter, in the fifth step of claim 26, there is a requirement of receiving enabling information from a remote source (*i.e.*, a source of information that is at a location different from the receiver station that is connected via a communications path) based on the step of tuning. *See, e.g.*, '091 Patent, 159:62-160:4. A POSITA would understand that "enabling information" is information that, when processed, enables the decryption of encrypted digital information. The "enabling information" can be a key, a reference to a key, a function that generates a key, or a reference to a function that generates a key. '091 Patent, 23:66-24:16; 151:44-52; 156:4-9; 156:18-24; 156:28-41. The encrypted information is then decrypted in the sixth step by processing the

enabling information from the remote source. Thus, claim 26 differs from the other independent claims discussed above in that, instead of the decryption key information being carried with the encrypted digital programming, the receiver is controlled to receive the decryption key information from a different remote source from the source of the digital programming.

79. Claim 27 depends from independent claim 26 and therefore includes all of the steps of the method of claim 26 and further comprises the step of storing information evidencing the step of decrypting.

80. Claim 30 depends from independent claim 26 and therefore includes all of the steps of the method of claim 26 and further requires that the decrypting step includes decrypting a video portion of the programming.

81. The asserted claims of the '091 Patent are directed to problems specific to computer networks and to the distribution of digital programming over such networks, which was a nascent technology in the 1980s presenting new challenges, such as how to securely deliver decryption key information across such networks.

82. As is evident from the above discussion, the asserted claims of the '091 Patent are directed to far more than simply "converting information from one format to another," as Apple contends. While the asserted claims recite decrypting as a step, when all the steps are considered together, the claims cover more than decryption and are directed to specific methods for controlling how the key information necessary to enable decryption at a receiver station is delivered and used. The asserted claims have no preemptive effect on decryption at large.

83. The claimed concepts are not abstract ideas – they are instead concrete and particular. The claimed concepts are not longstanding commercial practices, nor are they building blocks of the modern economy, methods of organizing human activity, mathematical

formulae, or ideas in and of themselves. On the contrary, they claim specific technological improvements to the nascent field of networked communications. These claimed concepts provide solutions that are necessarily rooted in computer network technology (a transmitter sends instruct-to-enable signals in encrypted digital information transmissions, in which the signals are processed such that a receiver station may locate decryption keys that are then used to decrypt the encrypted programming) to solve a problem that is necessarily rooted in computer networks (how to securely distribute decryption key information over a network so as to allow access to encrypted programming only for authorized users).

84. The steps of the asserted claims of the '091 Patent constitute more than the mere manipulation of information. Rather, they recite specific steps to take for securely distributing and locating highly sensitive control information (*e.g.*, instruct-to-enable signals to direct how to locate decryption keys) that is required to unlock protected programming.

85. When the actual language of each asserted claim of the '091 Patent is considered, it is evident that those claims provide detailed, concrete methods for controlling specific key location processes to insure that only authorized users can decrypt and view protected programming content. The claims of the '091 Patent are not directed to abstract ideas. Moreover, contrary to Apple's contention, and as illustrated above, claim 13 is not representative of the other asserted claims of the '091 Patent. Each asserted claim has different requirements and describes a different method.

B. The '091 Patent Claims Are Directed To Inventive Concepts

86. Assuming for sake of argument that the '091 Patent claims are directed to abstract ideas (an assumption with which I totally disagree), the claims of the '091 Patent include inventive concepts that go well beyond mere conversion of information from one format to another.

87. The asserted claims of the '091 Patent are directed to specific ways of controlling decryption that include methods to securely distribute enabling information necessary to provide or locate decryption keys required for decryption of protected content by the receiver station. This was an industry problem at the time of the patent. At a minimum, each asserted claim requires that both the instruct-to-enable signal(s) necessary to determine the fashion in which the receiver station retrieves a decryption key that is then used to decrypt an encrypted digital information transmission, and the encrypted digital information transmission itself, be received in the same transmission. The claims require that the instruction-to-enable signal detected in the encrypted digital information transmission be used to determine how to locate the decryption key (*see, e.g.*, claim 13), or be processed to actually provide a decryption key (*see, e.g.*, claim 20).

88. This subset of limitations transforms the concept of decryption into very specific, concrete methods by placing requirements on the manner in which a decryption key is to be located and/or generated and used. As a result, the asserted claims do not, for example, apply to (or preempt) cases where an instruct-to-enable signal is not sent with the encrypted digital information transmission. Nor do they preempt every process used to convert information from one format to another.

89. Further, it was certainly not routine or conventional to encrypt digital television or other digital programming before it was transmitted so as to restrict access only to authorized users. As noted above, the use of encryption to restrict access to programming was not routine and conventional in 1987 because descrambling was the conventional practice used to restrict access to programming. It follows, therefore, that the methods of the '091 Patent claims to control the decryption of programming at a receiver station based on processing of instruct-to-enable signal(s) that are included within the encrypted digital information transmission that

determine how the receiver station locates a decryption key, or are used to generate a decryption key, were not routine or conventional in 1987. Further, the remote delivery of decryption key information in transmissions over a network to allow for the secure decryption of encrypted content was far from conventional in 1987. The conventional approach was to distribute keys in smart cards mailed to subscribers or to have a technician physically visit the subscriber's home to enable the receiver.

C. The '635 Patent Is Not Directed To An Abstract Idea

90. I am informed and understand that PMC contends that various Apple software applications and products which are compatible with Apple's FairPlay Digital Rights Management (DRM) scheme and computer servers which implement the FairPlay DRM scheme infringe claims 1-4, 7, 13, 18, 20-21, 28-30, 32 and 33 of PMC's '635 Patent.

91. In its Motion to Dismiss, Apple contends that claim 1 of the '635 Patent is "directed to the abstract idea of converting information from one format to another, (*i.e.*, decrypting information." Apple's Motion at 19. I disagree.

92. The asserted claims of the '635 Patent (construed as PMC proposes) are directed to problems specific to the digital age and communications networks: securely distributing control signals over a network that may be used only by authorized subscribers to access and decrypt the encrypted content.

93. Although Apple only discusses claim 1 of the '635 Patent in its Motion, the asserted claims have differing requirements. Claim 1 of the '635 Patent is directed to a method for *controlling* the decryption of encrypted programming at a subscriber station. The first step of claim 1 requires receiving encrypted digital programming, the encrypted digital programming having an encrypted digital control signal. In the second step, the control signal is detected. A POSITA would understand the term "control signal," as used in the claims, to mean "a signal

that carries information, data or instructions that affects, controls, or enables processing." *See* '635 Patent, 149:6-26.

94. In the third step of claim 1, the control signal is passed to a decryptor that decrypts encrypted digital data at the subscriber station. A POSITA would understand a "decryptor" to be a device or circuit that performs decryption. Next, the method includes a step of decrypting the control signal. The fifth step requires decrypting the encrypted digital programming to form decrypted programming based on the control signal. The final step of claim 1 is presenting the decrypted programming to a viewer or listener.

95. Claim 2 of the '635 Patent is another independent claim and differs from claim 1 because, for example, it requires that a first encrypted digital control signal portion of received programming be decrypted using a first decryptor. An encrypted digital information portion of the programming is then passed to a second decryptor which decrypts it based on the decrypted control signal portion of the programming. A POSITA would understand this process to involve decryption of received information using two different key-algorithm pairs.

96. Claim 3 is another independent claim. It is distinct from claims 1 and 2 because it is directed to a method of controlling a remote transmitter station to communicate program material to a subscriber station and controlling the subscriber station to process or output a unit of programming. In contrast, claims 1 and 2 are directed to controlling the decryption of programming at a subscriber station and do not include processes to control a transmitter station.

97. The first step of claim 3 requires receiving a control signal which operates at the remote transmitter station to control the communication of a unit of programming and one or more first instruct signals and communicating the control signal to the remote transmitter station. A POSITA would understand a "remote transmitter station" to be a station that is at a location

different from a receiver station that transmits programming. *See* '635 Patent, 149:6-26. Additionally, a POSITA would understand a "control signal," as used in the '635 Patent claims, to be a signal that carries information or data that affects, controls or enables processing. *See, e.g.*, '635 Patent, 168:28-37. The "remote transmitter station" would be understood by a POSITA to be a station that is at a location different from a receiver station that transmits programming. *See, e.g.*, '635 Patent, 149:6-26.

98. Claim 3 then requires a step of receiving a code or datum identifying a unit of programming to be transmitted by the remote transmitter station and transferring the unit of programming to a transmitter.

99. The third step of claim 3 requires receiving at the remote transmitter station one or more second instruct signals which operate at the subscriber station to identify and decrypt the unit of programming or the one or more first instruct signals, the remote transmitter station transferring the one or more second instruct signals to the transmitter.

100. The last step of claim 3 recites transmitting from the remote transmitter station an information transmission comprising the unit of programming, the one or more first instruct signals, and the one or more second instruct signals, the one or more first instruct signals being transmitted in accordance with the control signal.

101. Thus, contrary to Apple's contentions, claim 3 is not focused on the decryption process at the subscriber station. Instead, it is directed to the transmission of the various components from a remote transmitter station that will be used at the subscriber station to process and output a unit of programming.

102. Claim 4 depends from independent claim 2 and includes all of the elements of claim 2 and additionally requires that the programming further includes encrypted video.

103. Claim 7 depends from independent claim 2 and includes all of the elements of claim 2 and further requires that the subscriber station detects, in a transmission channel including the programming, a second control signal portion used to decrypt the first control signal portion.

104. Claim 13 of the '635 Patent is another independent claim directed to a method of processing signals at a receiver station. It includes a step of receiving at least one information transmission. Next, the method recites a step of detecting a plurality of signals in the at least one information transmission. The third step is "changing a decryption technique" in response to at least a first of said plurality of signals. A POSITA in 1981 viewing the claim language in light of the specification would understand this term to mean changing the algorithm used for decryption. '091 Patent, 147:21-26. The fourth step of claim 13 recites decrypting a second of the plurality of signals on the basis of the changed decryption technique, wherein the decrypted second of the plurality of signals is embedded with executable instructions. The fifth step of the method requires passing the decrypted second of the plurality of signals to a controllable device. And the last step recites controlling the controllable device on the basis of the embedded executable instructions of the passed decrypted second of the plurality of signals.

105. Claim 18 is another independent claim directed to a method of processing signals at a receiver station that includes a step of receiving at least one encrypted digital information transmission, wherein the at least one encrypted digital information transmission is unaccompanied by any non-digital information transmission. In other words, a POSITA would understand that the encrypted digital information transmission is a transmission of digitally encoded content only, absent any content encoded in an analog format. *See* '635 Patent, 156:36-55.

106. In the second step of claim 18, code is located. In the third step, the code is passed to a processor. The fourth step recites controlling a decryptor that decrypts encrypted digital data to decrypt in a specific fashion on the basis of the code. A POSITA would understand this step to mean that the decrypting process is controlled through the selection of a decryptor, a decryption key and/or a decryption algorithm based on the received code. *See* '635 Patent, 150:23-58; 152:10-49.

107. The fifth step of claim 18 requires decrypting a portion of the at least one information transmission in the specific fashion, *i.e.*, using the selected decryptor, decryption key and/or decryption algorithm from the prior step.

108. The final step of claim 18 recites passing the decrypted portion of the at least one encrypted digital information transmission to one of the processor and an output device.

109. Claim 20 is another independent claim having differing elements than those of the claims discussed above. Claim 20 is directed to a method of processing signals at a receiver station. In the first step, at least one encrypted digital information transmission is received, wherein the at least one encrypted digital information transmission is unaccompanied by any non-digital information transmission.

110. The second step of claim 20 requires detecting a plurality of signals on the at least one encrypted digital information transmission. The third step recites decrypting at least one decrypted signal embedded with at least one instruct signal which is effective to instruct. In the fourth step, the at least one decrypted instruct signal is passed to a controllable device. In the final step, the controllable device is controlled on the basis of decrypted information included in the at least one decrypted instruct signal.

111. Claim 21 is another independent claim. It is directed to a method for decryptor activation in a network. Thus, it is directed to a different concept than the other claims of the '635 Patent discussed above.

112. In the first step of claim 21, a transmission comprising encrypted materials is received. In the second step, a first portion of the encrypted materials in the transmission is decrypted under first processor control. The third step recites inputting the first portion of the encrypted materials to a decryptor. In the last step, a second portion of the encrypted materials is decrypted under second processor control based on the step of decrypting the first portion of the encrypted materials.

113. Claim 28 depends from claim 21 and, therefore, includes all of the requirements of claim 21. Additionally, claim 28 requires that the encrypted materials comprise a portion of a television program.

114. Claim 29 also depends from claim 21 and includes all the elements of claim 21. In addition, claim 29 specifies that the transmission in the step of receiving a transmission and a signal necessary for decryption are received from different sources.

115. Claim 30 depends from claim 29 and, therefore, includes all of the elements of claim 29 and claim 21. Claim 30 further recites a step of contacting a remote transmission station to receive one of the transmission and the signal necessary for decryption.

116. Claim 32 is another independent claim. It is directed to a method of processing signals at a receiver station. The first step of claim 32 is receiving one or more encrypted digital information transmissions at the receiver station, wherein the one or more encrypted digital information transmissions are unaccompanied by any non-digital information transmission. In the second step, a plurality of signals in the one or more encrypted digital information

transmissions is detected, at least a first one of the plurality of signals including a control signal.

117. The third step of claim 32 requires controlling a decryptor that decrypts encrypted digital data in response to the control signal. The fourth step recites decrypting or enabling communication of at least a second of the plurality of signals on the basis of the step for controlling the decryptor. The fifth step requires passing the at least the second of the plurality of signals, after being decrypted or enabled, to a controllable device. In the last step, the controllable device is controlled by processing instructions embedded in the passed decrypted or enabled at least the second of the plurality of signals.

118. Claim 33 is another independent claim. It is directed to a method of processing signals at a receiver station. The first step requires receiving at least one encrypted digital information transmission, wherein the at least one encrypted digital information transmission is unaccompanied by any non-digital information transmission. The second step recites identifying a plurality of signals in the at least one encrypted digital information transmission. The third step requires selecting, by processing selection criteria, a first signal of the plurality of signals including downloadable code. A POSITA would understand the term "downloadable code," as used in the '635 Patent claims, to mean one or more data or instructions that are received in a transmission from a remote source and used to select a decryption algorithm, or to select, locate or generate a decryption key. *See* '635 Patent, 150:23-58; 152:10-49.

119. In the fourth step of claim 33, the downloadable code is passed to a processor. The fifth step recites controlling a decryptor that decrypts encrypted digital data to decrypt in a specific fashion on the basis of the downloadable code. The sixth step requires decrypting at least one second signal of the plurality of signals in the specific fashion. And, the last step requires passing the at least one second signal to one of the processor and an output device.

120. The asserted claims of the '635 Patent are directed to problems specific to computer networks and to the distribution of digital programming over such networks, which was a nascent technology in the 1980s presenting new challenges, such as how to securely deliver decryption key information across such networks.

121. As with the '091 Patent, it is evident from the above discussion, the asserted claims of the '635 Patent are not directed to simply "converting information from one format to another," as Apple contends. While some of the asserted claims of the '635 Patent recite decrypting as a step, when all steps are considered together the basic character of the claims covers more than decryption. The claims are directed to specific methods for controlling decryption at the receiver station that include additional steps directed to novel ways in which the decryption key is accessed, or using other information to enable decryption such as, for example, based on decryption of an encrypted control signal. Further, some of the claims are directed to specific applications which are used to change decryption techniques used at the receiver station (*e.g.*, claim 13). In addition, Apple overlooks the fact that claim 3 does not recite a decryption step at all. Claim 3 is directed to a process used to control a remote transmitter station to communicate program material to a subscriber station. The asserted claims of the '635 Patent have no preemptive effect on decryption at large.

122. The solutions provided by the asserted claims of the '635 Patent are not merely directed to decryption (indeed, claim 3 is not directed to decryption at all), but rather they recite the concept of remotely controlling the decryption by delivering control signals, or other signals, that are carried along with the encrypted digital information transmissions which are processed to determine a decryption technique or a specific fashion in which the receiver station decrypts the encrypted programming. Those concepts are not abstract ideas – rather, they are concrete

and particular. Those claimed concepts are not longstanding commercial practices, nor are they building blocks of the modern economy, methods of organizing human activity, mathematical formulae, or ideas in and of themselves. On the contrary, the asserted '635 Patent claims are directed to specific technological improvements to existing technology as of 1981. The claimed concepts provide solutions that are necessarily rooted in computer network technology to solve problems that are necessarily rooted in computer networks (*e.g.*, a transmitter station securely sends encrypted control signals with encrypted digital programming which are decrypted and then form the basis for decrypting the encrypted programming, or, as another example, a transmitter station sends an information transmission that includes a first plurality of signals which are used to change a decryption technique used to decrypt a second plurality of signals which include embedded executable instructions wherein the embedded instructions in the decrypted second plurality of signals is used to control a controllable device).

123. The steps of the asserted claims of the '635 Patent constitute more than the mere manipulation of information. Rather, they recite specific steps to take for securely distributing and locating highly sensitive control information (*e.g.*, codes, control signals or signals used to control decryptors, or used to change decryption techniques used to decrypt encrypted programming or information transmissions) to solve problems necessarily rooted in computer networks (*e.g.*, how to securely access information used to control decryptors).

124. When the actual language of each asserted claim of the '635 Patent is considered, it is evident that those claims provide detailed concrete methods for distributing decryption key information and controlling specific decryption processes or specific methods for controlling controllable devices that insure that only authorized users can view protected programming content. The claims of the '635 Patent are not directed to abstract ideas. Moreover, as is evident

from the above discussion, claim 1 is not representative of the other asserted claims. Each asserted claim has differing requirements and is directed to a different method. Indeed, asserted claim 3 is not directed to a decryption process at a receiver station at all, so claim 1 cannot be representative of claim 3 for at least that reason.

D. The '635 Patent Claims Are Directed to Inventive Concepts

125. Assuming for sake of argument that the '635 Patent claims are directed to abstract ideas (an assumption with which I absolutely do not agree), the claims of the '635 Patent include inventive concepts that go well beyond "converting information from one format to another."

126. Some of the asserted claims of the '635 Patent are directed to specific ways to securely distribute enabling information, codes, or signals necessary to control decryptors or to change the decryption techniques used at the receiver station to decrypt the incoming encrypted information transmissions. Additionally, claim 3 is not directed to a step of decryption at all. Rather, it is directed to a method of controlling a remote transmitter station to communicate specific program material to a specific subscriber station. These claims provide solutions to the industry problems of controlling decryption that existed at the time of the inventions. At a minimum, each asserted claim directed to subscriber station operations requires that both the control signal, instruct signal, or code or datum necessary to control a decryptor or to control the decryption technique to be used as well as the encrypted digital programming itself be received in the same transmission.

127. These limitations transform the concept of decryption into very specific, concrete methods by placing requirements on the manner in which decryption is controlled (*e.g.*, whether or not a receiver station is enabled to decrypt) and not just the manner of actual "conversion" from encrypted format to decrypted format. As a result, the asserted claims do not, for example, cover (or preempt) any particular method of decryption such as DES or RSA.

128. Further, it was certainly not routine or conventional to encrypt digital television or other digital programming before it was transmitted so as to restrict access only to authorized users. As noted above, the use of encryption to restrict access to programming was not routine and conventional in 1981 because scrambling was the conventional practice used to restrict access to programming. Moreover, the distribution of decryption key information across networks was far from conventional in 1981, as I discussed above. Thus, the methods recited in the '635 Patent claims to control the decryption of programming at a subscriber station based on processing of control signals, or other signals, codes or data that are included with the encrypted digital programming that are then used to control decryptors or control the decryption technique to be used were not routine or conventional in 1981.

E. The '649 Patent Claims Are Not Abstract

129. I am informed and understand that PMC contends that various Apple software applications, products and servers which are compatible with Apple's HTTP Live Streaming (HLS) protocol infringe claims 39, 54, 62 and 67 of PMC's '649 Patent.

130. In its Motion to Dismiss, Apple asserts that "the asserted claims of the '649 patent are directed to the abstract idea of using information to decide which television program to display." *See* Motion at 24. I disagree.

131. In fact, the asserted claims of the '649 Patent are directed to novel techniques for facilitating the delivery of digital television or digital video content from a transmitter station over a communications network to a receiver station. The transmitter station not only transmits the digital television or digital video content, but also transmits signals that control the processing of such content at the receiver station by including control information in a message stream along with the content. Since it is delivered in the same information transmission as the corresponding content, the control information provides timely intelligence for content selection

and processing at the receiver station. Based on a comparison between the control information with certain locally-stored or configured data, the receiver station employs a control processor to selectively input the streaming digital content to multiple other processors, for example, for decoding and presenting the content on a display device.

132. Claim 39 of the '649 Patent is directed to a method of processing signals in a television receiver having a plurality of processors. The first step is receiving an information transmission including digital television signals and a message stream. In this context, a POSITA would understand a "message stream" to be a series of digital data packages, each data package having a recognizable structure. *See* '649 Patent, 7:51-52; 8:10-15; 9:62-64, and FIG. 2I.

133. The second step of claim 39 is detecting the message stream in the information transmission. Then, the third step is inputting at least a first portion of the message stream to a control processor. In the fourth step, control information in said at least a first portion of the message stream is selected and communicated to at least one register memory. In this context, a POSITA would understand "control information" to be information, data or instructions that affect, control, or enable processing. *See* '649 Patent, 21:53-54; 23:30-41; 23:52-57; 25:65-26:18; 63:24-59; 269:12-26. Additionally, the POSITA would understand that the "register memory" is a memory space location to temporarily store information for use in later operations. '649 Patent, 63:24-59.

134. The fifth step of claim 39 requires comparing stored function invoking data to the contents of the at least one register memory. A POSITA would understand the term "stored function invoking data," as used in the '649 Patent claims, to mean data stored in memory that is used as a basis for causing preprogrammed functions stored at the receiver device to be

performed. *See, e.g.*, '649 Patent, 23:38-57; 269:12-36.

135. The sixth step of claim 39 recites inputting the digital television signals to the plurality of processors on the basis of one or more matches. The last step of the claim recites processing of the digital television signals simultaneously at two or more of the plurality of processors and displaying television programming included in the digital television signals. A POSITA would understand "digital television signals" to be television programming that includes digital audio and digital video signals. '649 Patent, 149:47.

136. Claim 54 is a different independent claim directed to a method of television or video signal processing at a television or video receiver, wherein the television or video receiver has a plurality of processors. A POSITA, reviewing this claim in light of the specification, would understand that it applies to an intermediate transmitter station, and thus differs from claim 39. In the first step of claim 54, an information transmission including a message stream is received. The second step recites receiving a control signal which operates at a transmitter station to communicate the information transmission to a transmitter. In the third step, the message stream is transmitted. The message stream enables the receiver station to select control information in the message stream, compare the control information to a stored function invoking datum, input selected digital television or digital video signals to a plurality of processors on the basis of one or more matches of the control information to the stored function invoking datum, simultaneously process the selected digital television or digital video signals at two or more of the plurality of processors, and display television programming or video information included in the selected digital television or digital video signals.

137. Claim 62 is another independent claim. It is directed to a method of processing signals at a receiver station wherein the receiver station has a video monitor and a plurality of

processors. The first step of the method requires receiving an information transmission including digital video signals and control information. A POSITA would understand "digital video signals" to be video signals encoded as discrete numerical values instead of an analog representation.

138. The second step of claim 62 requires detecting the control information in the information transmission and passing the control information to a control processor. A POSITA would understand a "control processor" to be a digital electronic device or circuit that controls other devices or circuits by operating on control information according to instructions. The third step recites communicating the control information selectively to at least one register memory. In the fourth step, stored function invoking data is compared to the contents of the at least one register memory. Digital video signals are communicated to at least one of the plurality of processors on the basis of one or more matches. A POSITA would understand "digital video signals" to be video signals encoded as discrete numerical values instead of an analog representation. The last step recites processing the digital video signals simultaneously at two or more of the plurality of processors and displaying video included in the digital video signals.

139. Claim 67 is another independent claim. It is directed to a method of processing signals in a television receiver, the television receiver having a plurality of processors. In a first step, an information transmission including digital television signals and cadence information is received. A POSITA would understand "cadence information," as used in the '649 Patent claims, to be fields in a data package such as headers, length tokens and/or end-of-file signals that enable a receiver apparatus to distinguish the individual messages within a message stream. *See* '649 Patent, 31:14-19.

140. Claim 67 further recites a step of detecting and passing the cadence information to a control processor and a step of communicating said cadence information selectively to at least one register memory.

141. Claim 67 next recites a step of comparing stored communication control information to the contents of the at least one register memory. Additionally, there is a step of communicating the digital television signals to the plurality of processors on the basis of one or more matches. The next step recites processing the digital television signals simultaneously at two or more of the plurality of processors. The final step is displaying television programming included in the digital television signals.

142. The asserted claims of the '649 Patent are not directed to simply "using information to decide which television program to display," as Apple contends. The basic character of the claims is directed to applications and processes for using control information to enable the delivery of digital television or digital video content from a transmitter station over a communications network to a receiver station. The transmitter station not only supplies the digital television or digital video content but also provides signals that control the processing of such content at the receiver station by including control information in a message stream transmitted along with the content. The control information provides timely intelligence for content selection and processing at the receiver station. Based on a comparison between the control information and certain locally-stored or configured data, the receiver station employs a control processor to control the selective input of the content to multiple other processors, for example, for decoding and presentation on a display device.

143. Compared to conventional receiver stations in 1987, which could only passively receive broadcast content, the claimed inventions of the '649 Patent offer significant technical

advantages because they enable the remote control of the receiver station operations by using the transmitted control information. Additionally, these inventions enable each receiver station to have flexibility in its content consumption, thereby enabling streaming media, which was in a nascent stage of development and adoption in 1987.

144. The asserted claims of the '649 Patent are directed to problems specific to computer networks and the distribution of streaming digital television programming and other digital content over such networks.

145. Thus, the solutions provided by the asserted claims of the '649 Patent are not merely directed to "using information to decide which television program to display," as Apple contends. Rather, they recite very specific and concrete steps for processing incoming digital information transmissions at both intermediate transmitter stations and receiver stations that include embedded control signals, message streams, and cadence information to extract relevant data packets and for comparing certain metadata associated with data packets to prestored data to determine relevant data packets associated with selected video or television programming. The claimed concepts are not abstract ideas. They are concrete and particular.

146. The '649 Patent claims are not directed to longstanding commercial practices, nor to building blocks of the modern economy, nor to methods of organizing human activity, or to mathematical formulae, or to ideas in and of themselves. On the contrary, the '649 Patent claims are directed to specific technological improvements to existing technology and solve problems that are necessarily rooted in computer networks (*e.g.*, how to process signals and programming received in messages.)

147. When the actual language of each asserted claim of the '649 Patent is considered, it is evident that those claims provide detailed, concrete methods for controlling specific video

signal processing processes such as how to process signals and programming received in messages. The claims of the '649 Patent are not directed to abstract ideas, longstanding commercial practices, building blocks of the modern economy, methods of organizing human activity, mathematical formulae, or ideas in and of themselves. The '649 Patent claims do not preempt streaming digital media as a whole. At the very least, the claims require digital television signals received in an information transmission with a message stream, so, for example, analog multimedia signals would not be preempted by the claims. Further, claim 39 is not representative of the other asserted claims of the '649 Patent as is illustrated above, contrary to Apple's claim. For example, claim 39 is directed to operations at the receiver station whereas claim 54 is directed to operations at an intermediate transmitter station. Apple has failed to address the differing requirements of each of the asserted claims.

F. The '649 Patent Claims Are Directed To Inventive Concepts

148. Assuming for the sake of argument that the '649 Patent claims are directed to abstract ideas (an assumption with which I do not agree), the claims of the '649 Patent include inventive concepts that go beyond merely "using information to decide which television program to display."

149. The asserted claims of the '649 Patent are directed to specific ways of controlling how the apparatus at a receiver station processes digital television or digital video content received from a transmitter station over a communications network using control signals included in the transmission.

150. Further, it was not conventional or routine practice in 1987 to transmit television or other programming digitally. Moreover, streaming digital media was not adopted until well after 1987 because of the various technological challenges I discussed above. Indeed, in 1987, the industry was heavily involved in addressing the various network-based challenges associated

with streaming digital media. Compared to the conventional receiver stations at the time, which could only passively receive broadcast content, the inventions of the '649 Patent offered significant technical advantages because they enabled the operations of individually-addressable receivers to be regulated remotely using control information transmitted along with the digital media content. This allowed each receiver station to have flexibility in its content consumption which was one of the technological challenges associated with the streaming of media content on demand to individual receivers.

G. The '088 Patent Is Not Directed To An Abstract Idea

151. I am informed and understand that PMC contends that various Apple software applications and products which are compatible with Apple's HTTP Live Streaming (HLS) protocol or the MPEG-2 standard infringe claim 14 of PMC's '088 Patent.

152. Apple contends that this claim is directed to the abstract idea of "monitoring how information is used." Apple's Motion at 24. I disagree.

153. Claim 14 of the '088 Patent is directed to a multimedia receiving apparatus for processing multimedia content and gathering related signal usage information. The apparatus includes a plurality of input ports for receiving multimedia signals. A POSITA would understand a multimedia receiving apparatus to be a device that is capable of receiving and processing content, using a digital processor, in multiple media formats. A POSITA would understand the term "input port," as used in this claim, to mean defined or designated connections or paths that feed received programming or instructions into a receiver for processing. *See* '088 Patent, 15:48-17:9. The POSITA would also understand "multimedia signals" to be signals that include information in multiple forms of media such as audio, video, computer programs, and data (*e.g.*, information, control signals, instructions). *See* '088 Patent, 15:53-16:10.

154. The apparatus of claim 14 further includes an output port, which a POSITA would understand to be a defined or designated connection or path used by one device or circuit to output signals to another device or circuit. *See* '088 Patent, 16:55-62.

155. The multimedia receiving apparatus further includes a processor operatively connected to the plurality of input ports and the output port. The processor is programmed for identifying a signal from at least one of the plurality of input ports, passing the signal from the processor to the output port, wherein a way the signal is passed from the output port is based on the step of identifying, and communicating information on a use of the identified signal, wherein the use of the identified signal comprises information of the passing of the identified signal based on the step of passing.

156. Claim 14 is directed to problems specific to digital multimedia and the distribution of digital multimedia content via computer networks which was a nascent technology in 1981 presenting many challenges, as I described above. Claim 14 is not directed to a longstanding commercial practice, a building block of the modern economy, a method of organizing human activity, a mathematical formula, or an idea in and of itself.

157. Claim 14 of the '088 Patent is directed to a very specific, concrete multimedia receiving apparatus configured with the specific components recited in the claim elements to receive and process content in multiple media formats and communicate information on what programming is used. The apparatus is configured to receive multimedia signals via multiple input ports, and a processor in the apparatus is programmed to identify at least one of the inputted multimedia signals, direct it to and beyond the output port based on signal identification, and to communicate signal usage information related to the identified signal by, for example, recording how or where the signal is passed and reporting the consumption of multimedia

content. Claim 14 has no preemptive impact on all methods for "monitoring how information is used." The claim is only directed to those multimedia receiving apparatuses that include the components recited in the claim and operate in the manner claimed.

H. Claim 14 of the '088 Patent Is Directed To An Inventive Concept

158. Assuming for sake of argument that claim 14 of the '088 Patent is directed to an abstract idea (an assumption with which I disagree), claim 14 includes inventive concepts that go beyond the alleged abstract idea of "monitoring how information is used."

159. Claim 14 is directed to a very specific implementation of a multimedia receiving apparatus with specified components and a processor that is programmed to perform specified operations. Claim 14 addresses how to receive and process multimedia signals and to monitor usage. The transmission and processing of digital multimedia was an industry problem at the time of the patent, and this invention addressed some of the challenges that were associated with digital multimedia at the time.

160. It was not conventional or routine in 1981 to transmit or receive digital multimedia content. Indeed, the MPEG working group was not even formed at the time of the invention. Nor was it conventional to communicate signal usage information at that time.

VII. The Asserted Claims of the '091 and '635 Patents Are Not Identical To Claim 1 of the '304 Patent

161. I understand that Apple asserts claim 2 of the '635 Patent is almost identical to claim 1 of the '304 Patent. *See* Apple's Motion at 11-12. While I recognize quite a few common elements shared by these two claims, I do not believe the differences in their limitations are nearly as trivial as what Apple alleges. Claim 2 of the '635 Patent recites two decryptors, "a first decryptor" and "a second decryptor," which split up the decryption functions that are performed by a single decryptor as recited in claim 1 of the '304 Patent. In claim 2 of the '635

Patent, the "first encrypted digital control signal portion of said programming" is decrypted by the "first decryptor" and the "encrypted digital information portion of said programming" is decrypted "using said second decryptor … based on the decrypted control signal portion." As a result, claim 2 of the '635 Patent further recites the step of "***passing*** said encrypted digital information portion of said programming ***and the decrypted control signal portion to a second decryptor at said subscriber station***." While in practice the " first decryptor" and the "second decryptor" may be either implemented in two physically distinct devices or integrated as related circuits or software modules on a single piece of hardware, the conceptual segregation of control signal decryption and content decryption could provide concrete technical advantages such as further deterrence against security attacks. For example, when the two decryptors implement different decryption algorithms (whether in software or in hardware) for the decryption of "control signal portion" and the "encrypted digital information portion" respectively, it makes unauthorized access or use of the encrypted "programming" even more difficult for hackers or pirates.

162. I understand that Apple also asserts claim 1 of the '635 Patent is "materially the same as" claim 1 of the '304 Patent. Apple's Motion at 12. I note that, in form or substance, these two claims do not align so closely with each other. For example, claim 1 of the '304 Patent recites a second "passing" step that is not explicitly present in claim 1 of the '635 Patent. Further, claim 1 of the '304 Patent recites that a single decryptor decrypts the encrypted control signal, and that same decryptor then uses the decrypted control signal to decrypt the encrypted information content. That feature of a single decryptor performing both layers of decryption is absent from claim 1 of the '635 Patent. Additionally, claim 1 of the '304 Patent recites a step of decrypting an "encrypted digital information portion" of the programming that is

not present in claim 1 of the '635 Patent. I disagree with Apple's assertion that the phrase "to form decrypted programming" merely states "the tautological conclusion that decrypting encrypted digital programming forms 'decrypted programming.'" In my opinion, it is at least debatable whether "to form decrypted programming" goes beyond the step of "decrypting" and further requires additional post-decryption processing, such as reassembly of decrypted information, in order to make the "decrypted programming" ready for presentation. Additionally, the last element in claim 1 of the '635 Patent not only requires that "said decrypted programming" be presented but also specifies that the programming be presented "to a viewer or listener," which implicitly identifies the media type of the decrypted programming as either visual or aural. All these are concrete and meaningful distinctions, rather than "minor wording differences," between claim 1 of the '635 Patent and claim 1 of the '304 Patent.

163. I understand that Apple further asserts "both claim 13 of the '091 patent and invalidated claim 1 of the '304 patent claim methods with analogous steps." Apple's Motion at 13. However, Apple seems to only focus on a high-level similarity between four of the seven recited method steps, such as "receiving," "detecting," "passing," and "decrypting." Even those four steps include notable differences between the two claims. For example, in the "detecting" step, claim 13 of the '091 Patent recites "detecting in said encrypted digital information transmission the presence of an instruct-to-enable signal" while claim 1 of the '304 Patent recites "detecting said first encrypted digital control signal portion of said programming." More importantly, claim 13 of the '091 Patent recites two method steps that are completely absent from claim 1 of the '304 Patent: "determining a fashion in which said receiver station locates a first decryption key by processing said instruct-to-enable signal" and "locating said first

decryption key based on said step of determining." Thus, claim 13 recites a significantly different programming decryption procedure in which the receiver station must first determine how to locate "a first decryption key" and then locate the key accordingly (*i.e.*, "based on said step of determining"). Furthermore, while claim 1 of the '304 Patent requires detecting and decrypting "said first encrypted digital control signal portion of said programming," claim 13 of the '091 Patent recites "***locating*** said first decryption key" which may cover the identification and retrieval of a locally stored decryption key as opposed to one downloaded from an incoming transmission. Such a dynamic key-locating approach could afford more flexibility for the decryption process and may also improve security for the protected programming. All these additional features in claim 13 of the '091 Patent make it significantly different from claim 1 of the '304 Patent.

I declare under penalty of perjury that the foregoing is true and correct. Executed in Charlottesville, VA on January 27, 2016.

Alfred C. Weaver

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